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Psychometric Properties of Quality of Life Scale (ESQoL) for Iranian Elementary School Students

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Abstract: The primary objective of this study was to assess the psychometric properties of the Elementary School Quality of Life (ESQoL) questionnaire among elementary school students in Faryab, Iran. The ESQoL, originally developed by Huang et al. in Taiwan, consists of 21 items. The study population included 1,800 individuals, with a sample size of 200 elementary school students (comprising 100 females and 100 males). Cluster random sampling was utilized to select classes from nine different elementary schools, encompassing both female and male students. Confirmatory factor analysis was employed to establish the validity of the questionnaire, while reliability was assessed using Cronbach's alpha and test-retest methods. The results of confirmatory factor analysis confirmed the presence of six scales within the questionnaire items, which included school function, family function, environmental life, vitality for life, learning ability, and peer relationships. The outcomes of the confirmatory factor analysis indicated that the model exhibited a satisfactory fit. Additionally, the quality of life questionnaire demonstrated strong internal consistency and test-retest reliability. Pearson's correlation coefficients, assessed over a two-week interval with 30 participants, ranged from 0.40 for the vitality for life and family function scales to 0.75 for the learning ability scale. In summary, this study's findings affirm the questionnaire's favorable validity and reliability for assessing the quality of life among elementary school students in Iran.

Keywords: Psychometric Properties, Elementary School Students, Elementary School Quality of Life Questionnaire (ESQoL)

Introduction

The World Health Organization (WHO, 1996) defines the quality of life as an individual's perception of their position in life in the context of the culture and value systems in which they live and concerning their goals, expectations, standards, and concerns. However, this definition of QoL does not specifically apply to children and adolescents. Children's QoL has been defined as the subjective perception of well-being and happiness (Davis et al., 2008). A multifaceted concept, QoL has extensive outcome measures (Rodrigues et al., 2015).

There are various ideas about the quality of life. Some researchers believe that simultaneous measurements of health multi-dimensions can be called quality of life. Some believe that there is no single definition for this concept that can be used in all stages of a disease or different societies. Most experts in this field agree that QoL considers the positive and negative facts of life and is multi-dimensional. On the other hand, it is considered a subjective and dynamic concept. Subjective in the sense that it must be determined by the person, based on his/her opinion, and not a substitute person, and dynamic in the sense that it will change over time, requiring measurement in a period. The subjectivity of domains of QoL is not sufficient from some scholars' perspective so some believe that

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each domain of QoL must have the capacity to be measured both subjectively and objectively (Baltaci & Karataş, 2014).

Social, family, and school environments are more important in assessing the QoL of children than adults (Thorrington & Eames, 2015). In addition to general health, QoL affects children's learning and academic achievements, which are regulated by factors such as family and social effects and life experiences (Maggino, 2016). Moreover, the assessment of children's QoL should be sensitive to age because physical and cognitive development has major effects. Children experience different problems and concerns during the different stages of development (Wee et al., 2006). For instance, children aged between 10-12 years are in the early stages of puberty, which is a period of rapid growth, characterized by a desire for more independence, attention to appearance, disagreement with parents, and increased importance of peer relationships (Missotten et al., 2011). In addition to the difference in concerns among age groups, the relevance of relationships with parents, teachers, and peers varies among cultures (Huang et al., 2017b). Although cultural differences are diminishing because of globalization, certain disparities remain, necessitating the cross-cultural validation of QoL instruments (Carbó-Carreté et al., 2016; Rajmil et al., 2012). However, most QoL instruments for children and adolescents have been developed in Western countries and therefore cannot be applied to children and adolescents from countries with different cultural backgrounds (Houben-van Herten et al., 2015; Simões et al., 2016).

In previous studies, children's QoL has been measured by employing "adult-centric" instruments (Parizi et al., 2014). Therefore, developing child-specific QoL instruments is imperative. Moreover, instruments specifically customized to assess QoL in children and adolescents are inferior to those available for adults (Ravens-Sieberer et al., 2014). The ESQoL questionnaire has 21 items, which have been made and validated by Huang et al. (2017a) in Taiwan. It measures 6 scales: school function, family function, environmental life, vitality for life, learning ability, and peer relationships. It has been used to assess the QoL of children aged between 10-12 years. Therefore, since there is no questionnaire appropriate to measure QoL in Iran and the existing questionnaire have been designed for special population groups (such as children with asthma or cancer) or designed in Western countries that are not in line with the Iranian culture, the validation of ESQoL questionnaire, which has been designed and validated in an Asian country with a similar culture to Iran, seems necessary. Also, this questionnaire is short and expressive, specifically designed to assess QoL and physical and mental health in elementary school students.

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Material and Methods

The population of the present study consisted of all female and male elementary school students in the city of Faryab, Kerman province, Iran, who were studying in 2020-2021. The total population was 1800 students. the sample size was calculated to be 196 students, using Cochran's formula (n=(N×t2×p×q) ÷ (N×d2×t2×p×q). However, to increase the generalization of the results, the sample size was considered to be 200 students (100 female students and 100 male students).

In this study, 50% of samples were selected from female students and the remaining 50% were selected from male students, using a stratified sampling method. Then, the multistage cluster sampling method was employed to select several schools (out of 9 female and male elementary schools). Then, some classes were selected among fourth to sixth-grade students, and finally, the samples were selected.

In this study, the data were analyzed by SPSS 21 and AMOS. First, the normality of the data was confirmed by the Kolmogorov-Smirnov test and then, Cronbach's alpha test, Pearson correlation test, independent t-test, and confirmatory factor analysis test was used to analyze the data.

Tools

The demographic information questionnaire and elementary school students' quality of life questionnaire (ESQoL) were used to collect data. The ESQoL has 21 items and was developed and validated by Huang et al. (2017a) in Taiwan. It assesses 6 factors; school function (items 1-5), family function (items 6-9), environmental life (items 10 and 11), vitality (items 12-14), learning ability (items 15-18), and peer relationships (items 19-21). The questionnaire has been designed to assess the quality of life of children aged between 10-12 years. It is scored based on a 5-point Likert scale (from never =1 to always=5). The scoring of items 1-9 was direct and the scoring of items 10-21 was reverse. The criterion validity of the questionnaire was calculated based on the main scale of the pediatric quality of life (pedsQoL). The concurrent validity of the questionnaire with the pedsQoL has been obtained for an overall scale of 0.43. The reliability of the scale was 0.70 using Cronbach's alpha method (internal consistency), which is acceptable.

Implementation

First, the 21-item questionnaire of ESQoL was translated from English into Persian, and then it was back-translated to test the accuracy of the translation. Then, the translated version of the questionnaire was provided to 15 elementary school students of different academic levels and age ranges, and they were asked to study the items and mark the incomprehensible and obscure questions to be reviewed and changed, if necessary, while being loyal to the English text of the questionnaire. The items were rewritten to eliminate the problems and were assumed to be understandable. Then, 200 ESQoL questionnaires were randomly provided to the students by their teachers via Shad and WhatsApp.

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Results

100 samples were female and 100 were male. Their age range was between 10 and 12 years. Mean and standard deviation of ESQoL scores in two groups of females and males were presented in table 1.

Table 1. The mean score of QoL and its factors in male and female elementary school students

Variable	Female		Male	
	Mean	SD	Mean	SD
Family function	50.98	26.74	48.32	16.45
Family function	59.56	28.25	53.64	22.16
Environmental life	42.50	26.32	45.29	21.54
Vitality for life	62.69	27.63	63.92	17.97
Learning ability	61.56	24.36	59.96	20.68
Peer relationships	64.06	33.71	65.56	26.07
Total	55.50	23.13	56.35	15.61

As the table 1 shows, the highest mean score of QoL in female students is related to the factor of peer relationships (64.04±33.71) and the lowest mean was related to the factor of environmental life (42.26±50.32). The total mean score of QoL in female students was 55.50±23.13. Considering the desired mean of the questionnaire (minimum score of 110 and the mean of 55), the QoL scores in female students in all factors and the total score of QoL were between 40.33 and 70.66, indicating medium QoL.

Table 2. Comparison of the mean scores of QoL in female and male students

Factor	Group	Mean	SD	T value	DF	p
Quality of life	Female	55.50	26.74	2.85	198	0.014
	Male	56.35	16.45			

As the above table shows, the calculated t (2.85) is larger than the significance level (0.001) with a degree of freedom of 198. In other words, the mean score of QoL in female students (55.26±50.74) was lower than the mean score of QoL in male students (56.35±16.45), indicating a significant difference ($p<0.001$); that is QoL of female students was significantly different from that of male students.

The confirmatory factor analysis, the scale of children's QoL

The scale of children's QoL was tested by using the "confirmatory factor analysis" under the following hypotheses: does children's QoL have a better fit with the data in a model with six uncorrelated factors or a model with six correlated factors with a higher order factor model? To accept the validity of a model and thus the validity of indicators or variables of the constructs (here, the items), it is required to show that there is coordination and alignment between the variables. To test the 6-factor hypothesis of "the Persian version of children's QoL", the confirmatory factor analysis method was used, and the method

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of "maximum likelihood estimation" was used to test the fit of the data and the two models. Each factor in the first model with 6 uncorrelated factors and the second model with 6 factors and a higher factor (children's QoL) was considered to be a latent variable and each item in the models was considered as an index. The results showed that the second model had a better fit with the data. The calculated X^2 in the first model (x^2= 1035.204, df=171, p=0.000) is significant but insignificant in the second model (x^2=155.815, df=135, p=0.106). The significant X^2 indicates a lack of a good fit for the model.

In addition to the indicator of good fit that is used to determine the model fit with the data, the non-normal fit index (NNFI), normal fit index (NFI), and comparative fit index (CFI) should be calculated. If these indices are equivalent or more than 0.9, there is a good fit between the model and the data. The "normal fit index" is influenced by the sample size and it is sometimes less than 0.9. Thus, the good fit index is calculated for assurance, which is based on the parameter of the population and is not influenced by the sample size.

The values of these indices in the first model were CFI=0.000, NFI=0.000, NNFI=0.43, GFI=0.640, and in the second model were CFI=0.976, NFI=0.976, NNFI=0.753, and GFI=0.950, indicating a good fit of the second model with the data.

The error approximation was calculated for both models, and the results showed that RMSEA=0.128 in the first model and RMSEA=0.022 in the second model. Another fit index is RMSEA, the closer it is to zero, the better the fit of the model. The following table shows the models measuring the goodness of fit.

Table 3. Models measuring the goodness of fit

Indices	X^2	Df	X^2/df	P	NFI	CFI	GFI	RMSEA
1st model	1035.204	171	6.054	0.000	0.000	0.000	0.640	0.159
2nd model	155.815	135	1.154	0.106	0.849	0.976	0.950	0.028

The results of Table 3 indicate that in the second model, the chi-square to the degree of freedom (1/154) is between 1 and 2, indicating an acceptable situation for the second model.

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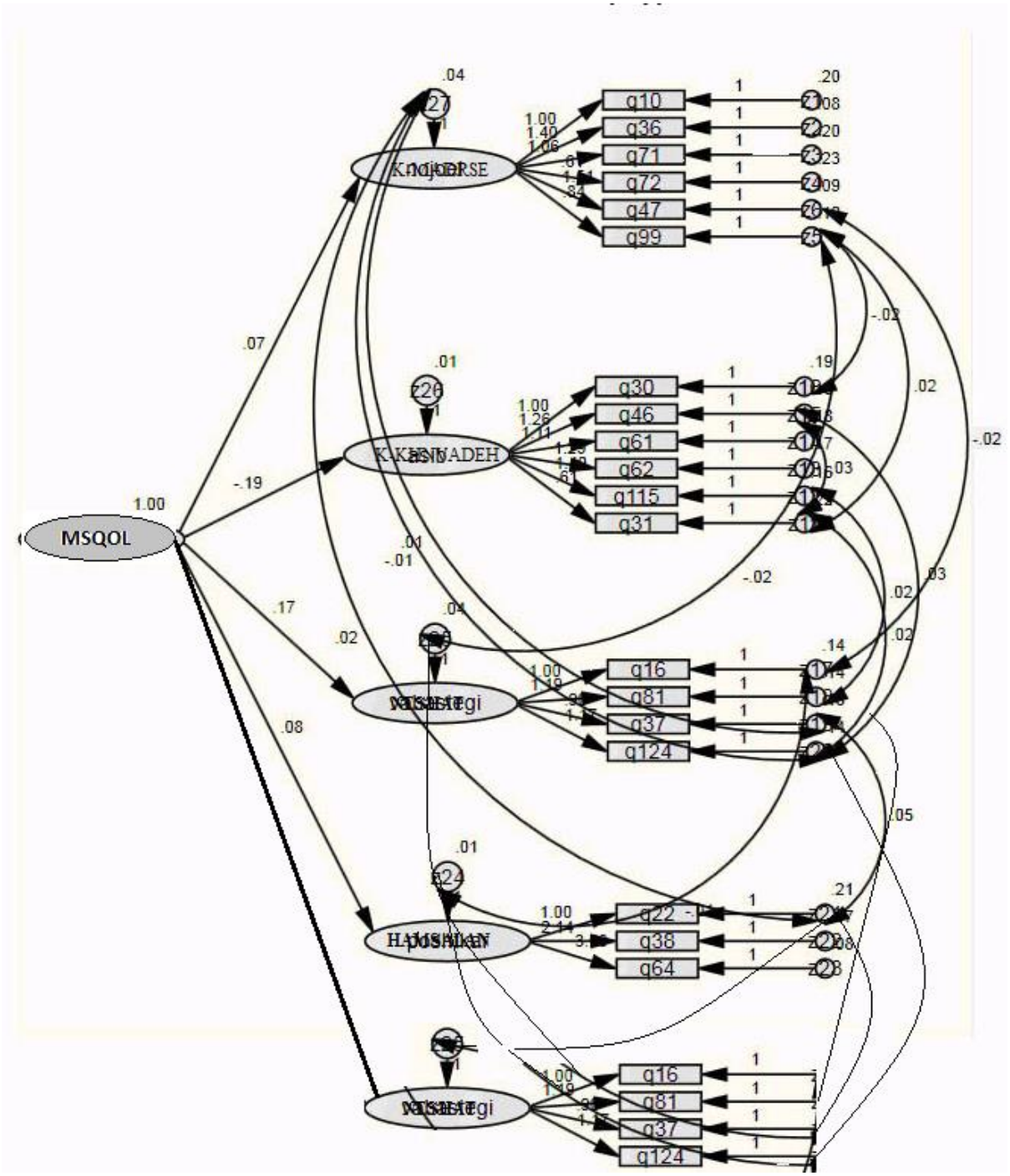

Fig 1. The research experimental model

The figure 1 shows the path of the 2nd model. Determining the measuring models (the items of each factor, which are shown in the box), the latent variable of children's QoL, which is based on the subscales of children's QoL, is displayed with an ellipse shape in the confirmed model. The one-way arrows represent from ellipses to rectangles show which factors the load of the items on, and the values written on the arrows represent the amount of factor variance that can be explained by the scale. The small

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arrows represent the residual variance (error) that is not explained by the factor and the two-way arrow represents the correlation between the errors.

Reliability of QoL questionnaire

The internal consistency method was used to determine the reliability using Cronbach's alpha and retest methods. The reliability coefficient for all scales of children's QoL was 0.60.

According to table 4, the subscales of family function (0.80) and school function (0.70) have appropriate alpha but vitality for life (0.52) and environmental life (0.50) have less alpha but are acceptable. The peer relationships factor (0.70) has good alpha but the learning ability alpha (0.22) is weak.

Table 4. Cronbach's alpha coefficients for the dimensions of students' QoL

Dimensions	School function	Family function	Environmental life	Vitality for life	Learning ability	Peer relationships
Value of alpha	0.70	0.80	0.50	0.52	0.22	0.70
Number of items	5	4	2	3	4	3
Scale means	9.21	8.62	8.87	3.13	13.32	16.44
SD	3.36	4.37	2.15	1.35	7.50	3.37

For the retest method, the Pearson correlation coefficient was used for the scores obtained from the 1st and 2nd tests (with an interval of two weeks).

Table 5. Re-test coefficient for the dimensions of children's QoL

QoL	School function	Family function	Environmental life	Vitality for life	Learning ability	Peer relationships
Retest coefficient	0.32	0.40*	0.55**	0.4*	0.75**	0.35
No. of samples	30	30	30	30	30	30

According to table 5, the subscales of family function (0.4), vitality for life (0.4), and environmental life (0.55) had a significant correlation, and these subscales had a good retest coefficient at the significance level of 0.05 with 90% confidence. However, the subscale of school function (0.34) had a relatively weak correlation, which was not significant. The subscale of learning ability (0.75) had significant correlation coefficients and a good retest coefficient at the significance level of 0.05 with 95% confidence. But, the subscale of peer relationships (0.35) had a relatively weak correlation, and the relationship was not significant.

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Discussion

The results of confirmatory factor analysis showed that the six factors (school function, family function, reward-dependence and vitality for life, learning ability, and peer relationships) had acceptable goodness of fit. The factor of school function is composed of five items to investigate children's perspectives about relationships with teachers and friends at school. The factor of the family function consists of 4 items to evaluate care and interaction of family members and parents' willingness to listen. The factor of environmental life includes 2 items on cleanness, pollution, and noise at home. The factor of vitality for life consists of 3 items to evaluate children's leisure time and independence, which include freedom of choice and negative reactions. The factor of learning ability has 4 items to examine the feelings related to school work (studying problems, periodical understanding, learning time and concentration, and negative academic progress). The factor of peer relationships includes 3 items to assess interactions with classmates, including negative relationships, peer acceptance, and friendship and bullying.

To test the fitness of data with the model, the two methods of confirmatory factor analysis and "maximum likelihood estimation" were used and the two models were tested. In the first model with six uncorrelated factors and the second factor with six factors and a higher rank factor (children's QoL), each factor was considered as a latent variable and each item as an indicator. The results showed that the second model had a better fit with the data.

To examine the reliability of the questionnaire, the data were analyzed using the internal consistency method and Cronbach's alpha. The results indicated desirable reliability of the factors of school function, family function, and peer relationships in the subjects; Cronbach's alpha coefficients for these factors ranged between 0.70 and 0.80. While, the factors of environmental life, vitality for life, and learning ability had relatively low reliability; Cronbach's alpha coefficients for these factors were obtained between 0.22 and 0.52. These findings are in line with the findings of Golzarpour et al. (2017), who validated children's health-related QoL questionnaire. According to their results, the obtained coefficients indicated a strong correlation of the questionnaire with the results of examinations (all coefficients were higher than 0.6). In this regard, Yaghmaei et al. (2012) implemented Kindel's health-related QoL questionnaire on children with asthma. They reported that the content validity and criterion coefficients were higher than 0.75. Also, the coefficients of Cronbach's alpha and re-implementation were reported as 0.91 and 0.97, respectively, which are in line with the results of the present study. Limited studies in Iran have investigated the psychometric properties of children's QoL questionnaire, which focused more on children with asthma, etc. The results of studies Yaghmaei et al. (2012) and Golzarpour et al. (2017) showed acceptable validity and reliability of the questionnaire. However, these

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results were obtained from studies on special populations of patient children (children with asthma, cancer, and diabetes).

Another advantage of this study was providing a short questionnaire. Considering the complexity and length of the 54-item ESQoL and numerous detailed factors of general health-related properties and daily activities and more importantly the subjects' unwillingness to answer a long tool in clinical and research situations, a short form of the questionnaire with 6 factors was designed. The 6-factor ESQoL has been used in different fields of behavioral sciences. It assesses people's understanding of physical, emotional, social, and cognitive performances (Haresabadi et al., 2011).

The shortening of this questionnaire due to the complexity and length of its original version provides the possibility of quick processing when necessary, and most importantly, it makes the subjects willing to answer the questionnaire in clinical and research situations. The importance of these issues becomes evident when the subjects are elementary school students who have less ability to answer and understand. Therefore, due to the validation results of the short-form questionnaire, which indicated the required internal consistency validity, this version of the questionnaire can be used instead of the long-form one. The results of the present study showed that the ESQoL scale is a good instrument to measure elementary school children's QoL (4^{th}, 5^{th}, and 6^{th}-grade students) and had desirable factors construct reliability, and validity. In this study, six factors were identified. The six factors had a medium correlation with each other, indicating each related factor, but distinct evaluate elementary school QoL. The 21-item ESQoL is a short questionnaire that can be implemented in schools. It may facilitate identifying concerns that may interfere with students' abilities to perform adequately and feel comfortable in school (Huang et al., 2017a).

According to the results of the present study, which was conducted on elementary school students in Faryab, Kerman Province, the validity and reliability of all factors, except for the factor of learning ability, were acceptable. Based on the results and that the research samples were probably under stress and anxiety of COVID-19, this issue should be considered in further studies to reach more reliable results. Another limitation of the research was the lack of presence of the student in school and thus online implementation of the questionnaire might have reduced the accuracy of the results. Moreover, since the study was implemented on 4^{th}- to 6^{th}-grade elementary school students, further studies can design a questionnaire appropriate to measure the QoL of children of lower ages. It is suggested to use a larger sample size in further studies and to consider the socioeconomic conditions of families because the quality of life is influenced by socioeconomic conditions.

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